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Service Manual

(Model : IS-971 / 971R / 971RF)



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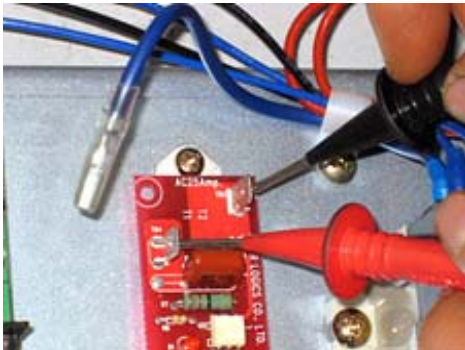
1. Service

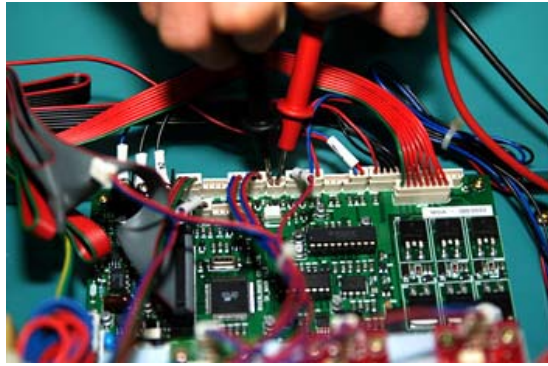
1-1. Temperature

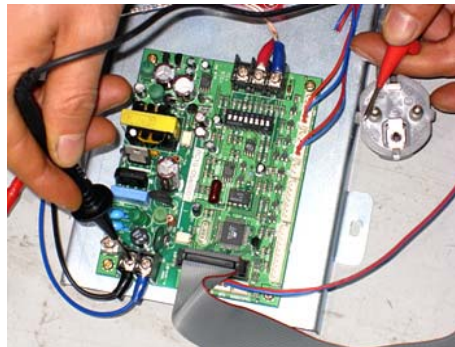
Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	Heater malfunction
Check point	1. After setting the Max temp and then press Start Button to operate the unit. 2. Check the Heater temp itself. (Be careful heater is very hot.) 3. Measure resistance checking positive terminal of heater using of the multi meter. → If resistance doesn't measure, it is a malfunction	
Solution	- Replace a heater. 1. "2-1-7. Fan Cover disassembly" Reference 2. "2-1-8. Heater disassembly" Reference 3. Assembly is in reverse disassembly. (Heater should be checked resistance for inferiority.)	

Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	Relay Malfunction
Check point	1. Press the Start Button to operate the unit, Measure Voltage of Output terminal using of the multi meter. → If Voltage doesn't measure, it is a malfunction	

Solution	- Replace the Relay. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-5. Relay disassembly” Reference 3. Assembly is in reverse disassembly.
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Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	SSR Malfunction
Check point	1. Set the SV value higher than PV, Press the Start Button. 2. Check the HEAT LED is lightning on Display. (No Flickering, Lightning) 3. Check Terminal Resistance using of the Multi meter. (Resistance MODE) → If resistance doesn't measure, it is a malfunction.	
Solution	- Replace the SSR. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-4. SSR disassembly” Reference 3. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	PCB Malfunction
Check point	1. Set the SV value higher than PV, Press the Start Button. 2. Check the HEAT LED is lightning on Display. (No Flickering, Lightning) 3. Check Terminal Resistance using of the Multi meter. (DC MODE) → If resistance doesn't measure, it is a malfunction.	
Solution	- Replace the PCB. 1. "2-1-1. Frame Cover disassembly" Reference 2. "2-1-3. Main board PCB disassembly" Reference 3. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	Wire from heating parts disconnection
Check point	1. Check the wire from Heater to SSR. 2. “ Wire disconnection Inspection” Reference → If resistance is not measured, it is disconnection. 3. Check the end terminal connection of the wire. → If connection is not good, it is disconnection.	
Solution	- If it is disconnection, replace the wire. 1. “2-1-1. Frame Cover disassembly” Reference 2. Replace the wire. 3. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	Refrigerant shortage
Check point	1. Set the Ambient temp 25°C to operate. Set the SV: 15°C and then wait for temp stabilization over 30minutes after reaching SV. 2. Measure Refrigerant capacity. 3. Normal range(Room temp : 25°C , Chamber temp : 15°C) - 1.9 ~ 2.1 Bar (28 ~ 32 Psi) ※ "2-2-11.Service valve connection or Refrigerant pressure inspection" Reference	
Solution	- Fill up Refrigerant gas 1. "2-1-1. Frame Cover disassembly" Reference 2. "2-2-12. How to fill up Refrigerant gas" Reference 3. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	Refrigeration System Malfunction
Check point	1. The unit operates. 2. Check whether the refrigeration System is noisy or not. → If it's noisy, the refrigeration System is malfunction. 3. Check the refrigeration voltage and current leakage.	
Solution	- Replace the refrigeration System. 1. "2-1-7. Fan Cover disassembly" Reference 2. "2-1-16. Refrigeration System back panel disassembly" Reference 3. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp doesn't increase	Refrigeration System Overload
Check point	1. Check the temp of Refrigeration head. 2. Over 95°C, Refrigeration part Overload	
Solution	- Cool down the Refrigeration system. 1. "2-1-7. Fan Cover disassembly" Reference 2. Waiting for the refrigeration System is cool or Make the Refrigeration temp is down using of compressed Air. 3. After operating the unit and then check the problems. 4. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp doesn't decrease	Refrigeration line (Filter, Dryer, Capillary tube)Chock
Check point	1. Operates the unit. 2. The low pressure (Refrigerant gas) indicates vacuum pressure. → Dryer chock.	
Solution	- Replace the Dryer	

Classification	Symptom	Service Factor
Temperature	Temp doesn't decrease	Refrigeration fan motor malfunction
Check point	1. Operates the unit. 2. Check whether the refrigeration part works. 3. If the refrigeration part works, Check the input voltage of Fan motor using of the multi meter. 4. If the pressure is normal, the fan motor is malfunction.	
Solution	- Replace the fan motor. 1. "2-1-7. Fan Cover disassembly" Reference	

	2. “2-1-9. Motor / Fan disassembly” Reference 3. Assembly is in reverse disassembly.
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Classification	Symptom	Service Factor
Temperature	Temp doesn't decrease	Condenser dust contamination
Check point	1. Check dust on the condenser.	
Solution	-Clean up the condenser. 1. Remove the Condenser cover panel on the bottom of the unit. 2. Clean dust on the condenser. 3. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp doesn't decrease	Disconnection of a Refrigeration wire or terminal
Check point	1. Operates the unit. 2. Check the refrigeration works. 3. Check a disconnection of terminal or Wire from the refrigeration M/C to the refrigeration part.	
Solution	- Check the wire. 1. “2-1-1. Frame Cover disassembly” Reference 2. Change a wire in case of wire disconnection. 3. Change a terminal in case of terminal disconnection. 4. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp trembling	Wrong PID Value
Check point	1. Press Temp button with turning on the Main power switch at the same time. 2. Press Auto tuning Button to check the PID value. → If the unit PID value is different from a basis PID value, It's error.	
Solution	- Operate the Auto tuning. 1. Press Temp button to set the desired temp. 2. Press A/T button for a second, Auto Tune displayed on the temp display and A/T LED ON. 3. After pressing Start Button, RUN LED is ON. A/T LED flickers and then operates the Auto Tune. 4. Finishing Auto Tune, LED is off. The temp by Auto Tune keeps controlling temperature.	

Classification	Symptom	Service Factor
Temperature	Temp trembling	PCB Malfunction
Check point	1. - Operate the Auto tuning. →, If the temp is trembling after Auto tuning, It is PCB Malfunction	
Solution	- Replace the PCB. 1. "2-1-1. Frame Cover disassembly" Reference 2. "2-1-3. Main board PCB disassembly" Reference 3. Assembly is in reverse disassembly.	

Classification	Symptom	Service Factor
Temperature	Temp trembling	Temp Sensor connection inferiority
Check point	1. Check the temp sensor terminal bolts of PCB. → If bolts are loosen, it cause disconnection inferiority.	
Solution	- Tighten the temp sensor terminal bolts of PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. Tighten the temp sensor terminal bolts of PCB. 3. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Temperature	Temp trembling	Refrigeration malfunction, Endothermic value fluctuation
Check point	1. Operates the unit. 2. Set the temp 25°C and keep the temp. 3. Check the low pressure of refrigeration, when the temp trembles. If the low pressure of refrigeration trembles together, the refrigeration part is malfunction.	
Solution	1. Check the refrigeration system parts.. Check Refrigerant shortage / Refrigerant overcharge / Ambient temp / Condenser dust	

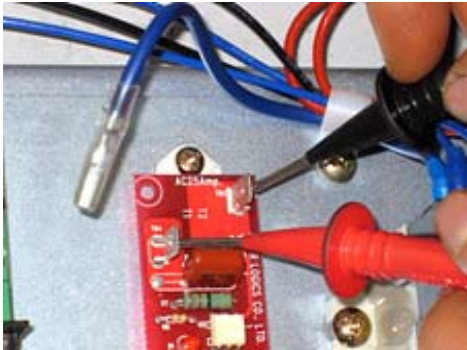
Classification	Symptom	Service Factor
Temperature	Variation Cause	PCB Malfunction
Check point	1. Replace the PCB to check the situation. → If Variation is not caused, it is PCB Malfunction.	
Solution	- Replace the PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-3. Main board PCB disassembly” Reference 3. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Temperature	Variation Cause	BIAS Value modification
Check point	1. Measure temp of the inner chamber using of A exterior temp detector installed in the middle. → If displayed temp and the temp detector value are different, Modify BIAS Value..	
Solution	- BIAS Value Modification - 1. Install A exterior temp detector verified inner chamber. 2. After setting the temp value, Wait for the temp that is stabilized.(About 2hours over) 3. Measure the temp detector installed inner chamber. 4. Press Temp Button six times to modify the Bias value. 5. Modify the BIAS value to set the temp is equal to the temp detector. And then press the ENTER Button to restore the value. 6. Modify the temp value.	

Classification	Symptom	Service Factor
Temperature	Variation Cause	Measurement Inferiority
Check point	1. Check the temp detector position. → If the temp detector is not in the middle position, It's a malfunction.	
Solution	- Measuring position change. 1. The sensor of temp detector positioned in the middle of inner chamber. 2. Fixture and the sensor of temp detector should be intervals minimum 15mm. (Standard Test Guide Reference)	

Classification	Symptom	Service Factor
Temperature	Variation Cause	Temp Sensor connection inferiority
Check point	1. Check the temp sensor terminal bolts of PCB. → If bolts are loosen, it cause disconnection inferiority.	
Solution	- Tighten the temp sensor terminal bolts of PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. Tighten the temp sensor terminal bolts of PCB. 3. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Temperature	Temp keeps rising	PCB Malfunction
Check point	1. Replace the PCB to check the symptom. → If Variation is not caused, it is PCB Malfunction.	
Solution	- Replace the PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-3. Main board PCB disassembly” Reference 3. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Temperature	Temp keeps rising	SSR Malfunction
Check point	1. Separate the Input SSR of Harness. 2. Measure resistance checking SSR output using of the multi meter. (Resistance MODE) → If resistance measure, it is SSR malfunction.	
Solution	- Replace the SSR. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-4. SSR disassembly” Reference 3. The assembly is reverse order of disjointing.	

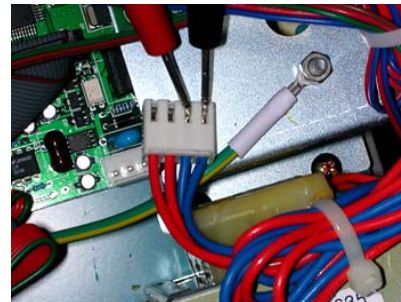
1-2. Power

Classification	Symptom	Service Factor
Power	No Power	Fuse disconnection
Check point	1. Check the Fuse using of the multi meter. → If Resistance is not measured, Fuse disconnection.	
Solution	- Replace the Fuse. 1. “2-1-14. Fuse disassembly” Reference 2. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Power	No Power	Switch Malfunction
Check point	1. Measure output terminals No.2,5 When turning on the Main power. → If Power is not measured, Switch Malfunction.	
Solution	- Replace the Switch. 1. “2-1-10. Display PCB disassembly” Reference 2. Separate Switch wiring. (When assembling, location is a caution.) 3. Pull out the parts which are involved in the Switch upper & bottom from the panel. 4. The assembly is reverse order of disjointing.	



Classification	Symptom	Service Factor	
Power	No Power	PCB Malfunction	
Check point	1. Check Voltage from output terminal of AC in PCB. → If Voltage is measured without Power, PCB Malfunction. -Power- * Blue: 35V * Red:13.7V		
Solution	- Replace the PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-3. Main board PCB disassembly” Reference 3. The assembly is reverse order of disjoining.		

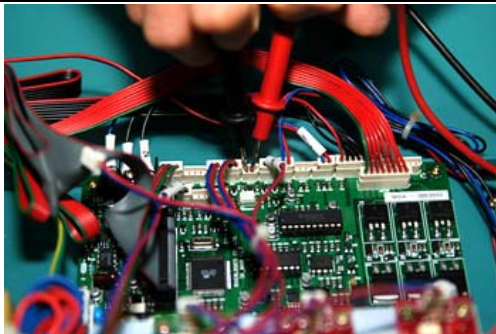
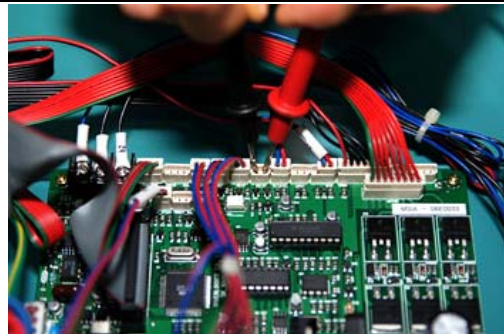
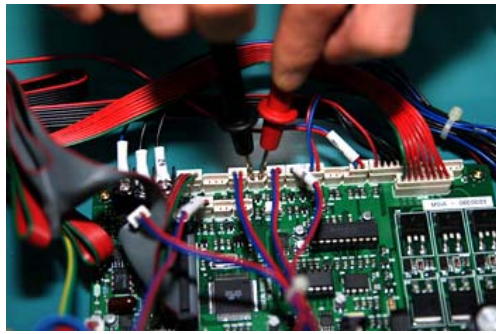
Classification	Symptom	Service Factor	
Power	No Power	Trans Malfunction	
Check point	1. Check Voltage from output terminal of AC in PCB. → If Voltage is measured without Power, PCB Malfunction. -Power- * Blue: 35V * Red:13.7V		
Solution	- Replace the Trans.		

	1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-17. Trans disassembly” Reference 3. The assembly is reverse order of disjoining.
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Classification	Symptom	Service Factor
Power	No Power	Laboratory power Malfunction
Check point	1. Check the electricity of socket with multi meter. → If power doesn't measure or value is lower or higher, Laboratory power Malfunction.	
Solution	-Make Power of Laboratory stabilization.	

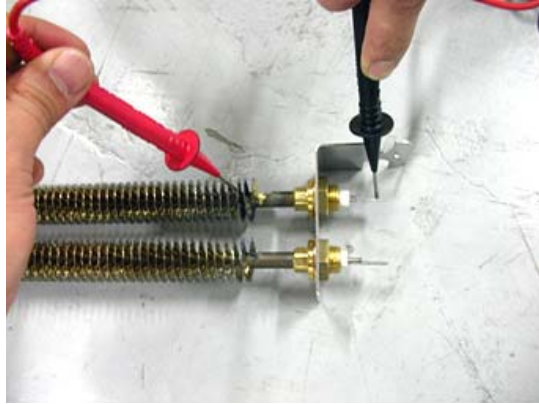
Classification	Symptom	Service Factor
Power	No Power	Power code line disconnection inferiority
Check point	1. Check between Fuse holder and Soldering part of power code line. → If Soldering part is separated, disconnection inferiority	
Solution	- Sold again. 1. “2-1-1. Frame Cover disassembly” Reference 2.. After soldering between Main cord and fuse holder, Tube it with Shirking tube. 3. The assembly is reverse order of disjoining.	

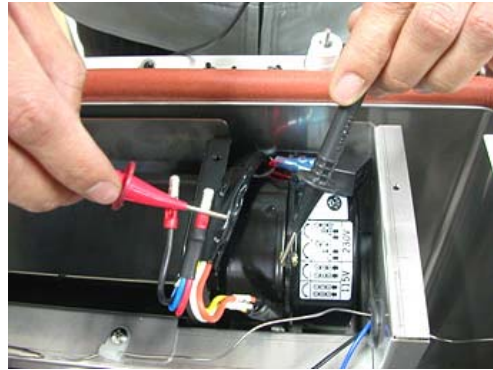
Classification	Symptom	Service Factor
Power	No power	Short circuit of power or disconnection
Check point	1. “2-2-10 Wiring short circuit Inspection” Reference → If resistance is not measured, it is short circuit. 2. Check the end terminal of wire. → If wire connection is not good, disconnection Malfunction.	
Solution	- Check the wire. 1. “2-1-1. Frame Cover disassembly” Reference 2. If it's short circuit, replace the wire. 3. If it's disconnection, reassemble the terminal. 4. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor	
Power	Power shut off during operation	PCB Malfunction	
Check point	1. Turn on the Main power Switch. 2. Set the SV value 100°C, Press the Start Button to operate. 3. Check DC Voltage from heater output terminal in PCB. → If Voltage is not measured, PCB Malfunction. 4. Check DC Voltage from Relay output terminal in PCB. → If Voltage is not measured, PCB Malfunction. 5. Check DC Voltage from Refrigeration system output terminal in PCB. → If Voltage is not measured, PCB Malfunction.	 - Heater -	 - Relay -
		 - Compressor -	
Solution	- Replace the PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-3. Main board PCB disassembly” Reference 3. The assembly is reverse order of disjointing.		

Classification	Symptom	Service Factor
Power	Power shut off during operation	Over current
Check point	1. Check the fuse and then replace it. 2. Check an electric current both ground terminal and Wire using of the multi meter. (Check the polar terminal of Wiring) 3. Check Heater leakage. → 1. If fuse is down, replace it. If heater is not leakage and 2. If current Ground terminal and wire doesn't apply current during measurement, It's Over current.	
Solution	- Over current is possible, but check shot circuit for all wires and electric parts.	

Classification	Symptom	Service Factor
Power	Power shut off during operation.	Electric capacity over in Multi outlet
Check point	1. Check an electric outlet capacity connected the unit. 2. Check total units connected the multi electric outlet. → If total units connected the multi electric outlet is over than the outlet capacity, multi electric outlet malfunction.	
Solution	- Use the multi electric outlet under capacity.	

Classification	Symptom	Service Factor
Power	Power shut off after turning on	Heater leakage
Check point	1. Check the fuse. 2. Separate the heater terminal and wire. 3. Measure Resistance both the heater terminal and heater exterior. → If fuse is down and heater resistance is measured, Heater leakage.	
Solution	- Replace the heater. 1. “2-1-7. Fan Cover disassembly” Reference 2. “2-1-8. Heater disassembly” Reference 3. The assembly is reverse order of disjointing. (Heater should be checked resistance for inferiority.)	

Classification	Symptom	Service Factor
Power	Power shut off after turning on	Motor leakage
Check point	1. Check the fuse. 2. Separate the motor wires. 3. Measure Resistance both the motor wire and motor exterior. → If motor resistance is measured, Motor leakage.	
Solution	- Replace the motor. 1. “2-1-7. Fan Cover disassembly” Reference 2. “2-1-9. Motor / Fan disassembly” Reference 3. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
Power	Power shut off after turning on	Refrigeration System Leakage
Check point	1. Separate the Refrigeration System wires. 2. Measure Resistance for two terminals each in three times using of the multi meter. → If Resistance is measured in three cases, Refrigeration System Leakage.	

Solution	- Replace the Refrigeration System 1. “2-1-7. Fan Cover disassembly” Reference 2. “2-1-16. . Refrigeration Unit disassembly” Reference 3. The assembly is reverse order of disjointing.
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Classification	Symptom	Service Factor
Power	Power shut off during operation.	Wiring insulation malfunction
Check point	1. Check the fuse. 2. If fuse is down, replace it.. 3. Check Resistance both ground wire and Main plug using of the multi meter. → If resistance is measured, it is short circuit.	
Solution	- Replace the wire. (“Wiring short circuit Inspection” Reference)	

Classification	Symptom	Service Factor
Power	Power shut off after turning on	Electric capacity over in Multi outlet
Check point	1. Check the fuse. 2. Check an electric outlet capacity connected the unit. 3. Check total units connected the multi electric outlet. → If total units connected the multi electric outlet is over than the outlet capacity, multi electric outlet malfunction.	
Solution	- Use the multi electric outlet under capacity.	

1-3. DISPLAY

Classification	Symptom	Service Factor
Display	Push button error	DISPLAY PCB error
Check point	1. Disconnect Display board from the panel, test pushing all buttons one by one → If you don't detect any reaction from button, the Display board is out of order	
Solution	- Replace the Display board 1. Refer to “ 2-1-10. Display board disassembly ” 2. The assembly is reverse order of disjoininging.	

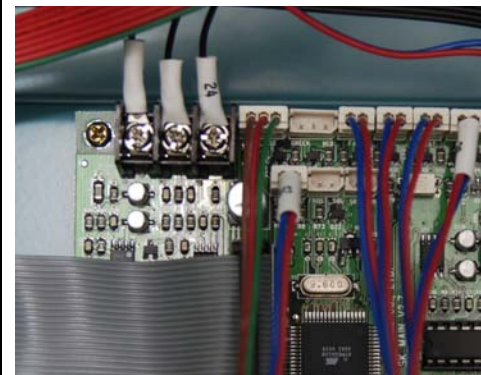
Classification	Symptom	Service Factor
Display	Push button error	DISPLAY PCB assembly error
Check point	1. DISPLAY PCB의 고정 상태를 확인한다. 2. DISPLAY PCB를 판넬에서 분리하여 모든 버튼을 직접 눌러 본다. → DISPLAY PCB의 고정이 유격이 있고, 분리하여 버튼을 직접 눌렀을 때 정상 작동을 하면 조립 상태 불량	
Solution	- Replace Display board 1. Refer to “ 2-1-10. Display board disassembly ” 2. The assembly is reverse order of disjoininging.	

Classification	Symptom	Service Factor
Display	Display error	DISPLAY PCB error
Check point	1. Disassemble the Harness on the Display board, and re-assemble correctly. → If you still notice display error, the Display board is out of order	
Solution	- Replace DISPLAY PCB. 1. Refer to “ 2-1-10. Display PCB disassembly ” 2. The assembly is reverse order of disjoininging.	

Classification	Symptom	Service Factor
Display	Display error	Main PCB error
Check point	1. Disassemble the Harness on the Display board, and re-assemble correctly. 2. Replace Panel on Display board → If you still notice display error, the Main control board is out of order	
Solution	Replace a new PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-3. Main board PCB disassembly” Reference 3. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Display	Display error	Temp. Sensor error
Check point	1. Replace a new Temp. Sensor. → If display is OK, the previous Sensor is out of order	
Solution	- Replace a new Temp. Sensor 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-7. Fan Cover disassembly” Reference 3. “2-1-11. Temperature control Sensor disassembly” Reference 5. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Display	Display error	Temp sensor contact error
Check point	1. Check the bolts of Temp. Sensor on the Main control board. → If you detect bolting is loose, contact error	
Solution	- Fasten the bolts of Temp. Sensor on the Main control board. 1. “2-1-1. Frame Cover disassembly” Reference 2. Fasten the bolts of Temp. Sensor on the Main control board. 3. The assembly is reverse order of disjoining.	



Classification	Symptom	Service Factor
Display	Display error	Harness contact error
Check point	1. Disassemble the Harness on the Display board, and re-assemble correctly. → If Display turns OK, Harness contact was error	
Solution	- Replace Display board 1. Refer to “2-1-10. Display PCB disassembly” 2. Disassemble the Harness on the Display board, and re-assemble correctly. 3. Assembly is reverse order of disjoining.	



1-4. Door

Classification	Symptom	Service Factor
Door	Not fixed	Gas spring
Check point	1. When opening the door completely, the door should not be closed by Gas spring.	
Solution	- Replace the Gas spring. 1. “2-1-13. Door disassembly” Reference 2. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Door	Not fixed	Door hinge damage
Check point	1. Check the spring of hinge. → If spring is separated, It's a malfunction.	
Solution	- Replace the door hinge 1. “2-1-13. Door disassembly” Reference 2. Assembly is in reverse disassembly.	

1-5. Noise

Classification	Symptom	Service Factor
Noise	Noise while operation the unit	Motor error
Check point	1. Check if Fan is interfered by something → If there is nothing to interfere Fan, Motor is out of order	
Solution	- Replace a new Fan. 1. “2-1-7. Fan Cover disassembly” Reference 2. “2-1-9. Motor / Fan disassembly” Reference 3. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
Noise	Noise while operation the unit	Compressor error
Check point	1. Check if there is mechanical crushing noise on the compressor → If there is noise, the compressor is out of order	
Solution	- Replace compressor 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-16. Compressor unit disassembly” Reference 3. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
Noise	Noise while operation the unit	Noise from overloaded compressor
Check point	1. Check if there is mechanical crushing noise on the compressor → If there is noise, the refrigerant is too much filled 1) Set room temp on around 25℃, set SV on 15℃.wait 30mins to be stable running 2) Measure the refrigerant. 3) Proper range(Room temp : 25℃, SV : 15℃) - 1.9 ~ 2.1 Bar (28 ~ 32 Psi) ※ Refer to "2-2-11.Service valve connection and refrigerant pressure"	
Solution	- Release the overloaded refrigerant 1. "2-1-1. Frame Cover disassembly" Reference 2. "2-2-11. .Service valve connection and refrigerant pressure" reference 3. "2-2-12. Filling refrigerant" reference. 4. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
Noise	Noise while operation the unit	Loosen compressor holding nuts
Check point	1. Check the noise is coming from compressor itself or not. 2. Check the holding nuts are loose.	
Solution	- - If they are loose, tighten them by using spanner. 1. "2-1-1. Frame Cover disassembly" Reference 2. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
Noise	Noise while operation the unit	Noise from Fan interference
Check point	1. Open Bottom panel of the Chamber and check. → Check Fan interference	
Solution	- Reassemble the unit.. 1. “2-1-7. Fan Cover disassembly” Reference 2. “2-1-9. Motor / Fan disassembly” Reference 3. If the Fan is not damaged, re-assemble the fan. 4. The assembly is reverse order of disjointing.	

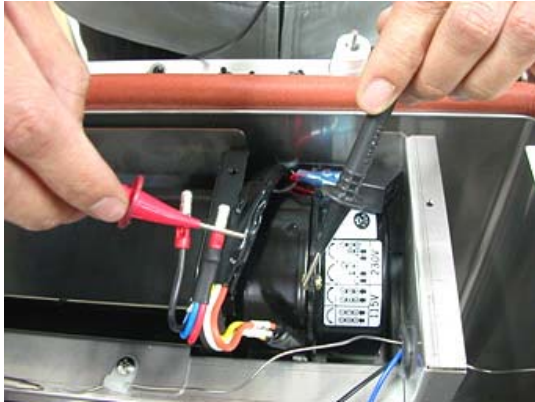
Classification	Symptom	Service Factor
Noise	Noise while SHAKING	Motor error
Check point	1. If the motor generate noise, the motor is error	
Solution	- Replace the motor with a new one 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. “2-1-20. Shaking Motor disassembly” Reference 4. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
Noise	Noise while SHAKING	Noise coming from plate touching
Check point	1. Check if the noise is coming from plate touching while Shaking. → Plate is error	
Solution	- Replace Plate .. 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
Noise	Noise while SHAKING	Bearing error
Check point	1. Check if the bearing has gap by turning Rotation Pin Set → If the bearing has gap, the bearing is error	
Solution	- Replace Rotation Pin Set. 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. “2-1-21 Rotation Pin Set disassembly” Reference 4. The assembly is reverse order of disjoining.	

1-6. Current leakage

Classification	Symptom	Service Factor	
Leakage	Circuit breaker activates	Heater	
Check point	Step 1. Check out fuses. => If fuses are out of order, current leakage happens. Step 2. Taking out wiring of heater. Then, measure resistance between terminal and surface of heater with resistance meter. => If resistance measures, current leakage happens.		
Solution	- Replace a new heater. 1. “2-1-7. Fan Cover disassembly” Reference 2. “2-1-8. Heater disassembly” Reference 3. The assembly is reverse order of disjointing.(Check heater resistance before assembly)		

Classification	Symptom	Service Factor	
Leakage	Circuit breaker activates	Motor	
Check point	Step 1 . Check out fuses. Step 2. Taking out motor wiring. Step 3. Check out resistance between motor wire and surface of motor with resistance meter. → If fuses are out of order or resistance measures, current leakage happens.		
Solution	- Replace a new motor. 1. “2-1-14. Fuse disassembly” Reference 2. “2-1-7. Fan Cover disassembly” Reference 3. “2-1-9. Motor / Fan disassembly” Reference 4. The assembly is reverse order of disjointing.		

Classification	Symptom	Service Factor
Leakage	Circuit breaker activates	Compressor
Check point	Step 1. Taking out wiring of compressor. Step 2. Measure 3 different resistance of 3 wires between 2 ends. → If all 3 different resistance are measured, current leakage happens.	
Solution	- Replace compressor 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-16. Compressor unit disassembly” Reference 3. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
Leakage	circuit breaker activates	Insulation of wire
Check point	Step 1. Check out fuses. Step 2. Replace fuses if it is out of order. Step 3. Measure resistance between main plug and earth resistance meter. → If resistance measures, insulation of wire is out of order.	
Solution	- Replace wires (Refer to “wire snap examination”)	

1-7. RS Communication

Classification	Symptom	Service Factor
Communication	No connection	Communication PCB
Check point	1. Check out connection of wires of Communication PCB. 2. Replace communication PCB. → If it works after replacement, communication PCB is out of order.	
Solution	- Replace communication. 1. “2-1-10. Display PCB disassembly” Reference 2. “2-1-15. Communication Board disassembly” Reference 3. The assembly is reverse order of disjointing.	

1-8. SHAKING

Classification	Symptom	Service Factor
SHAKING	SHAKING error	Main PCB error
Check point	1. Replace a new Main Board PCB → If the unit works OK, PCB was error	
Solution	- Replace PCB. 1. “2-1-1. Frame Cover disassembly” Reference 2. “2-1-3. Main board PCB disassembly” Reference 3. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
SHAKING	SHAKING error	Motor error
Check point	1. If the motor generate noise, the motor is error	
Solution	- Replace shaking motor 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. “2-1-20. Shaking Motor disassembly” Reference 4. The assembly is reverse order of disjoining.	

Classification	Symptom	Service Factor
SHAKING	SHAKING error	PAN SPRING error
Check point	1. Check PAN SPRING is broken.	
Solution	- Replace Pan Spring. 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. Replace Pan Spring. 4. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
SHAKING	SHAKING error	VIBRATING FRAME damaged
Check point	1. Check VIBRATING FRAME has been damaged.	
Solution	-Replace a new VIBRATING FRAME. 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
SHAKING	SHAKING error	Harness contact error
Check point	1. Check Harness contact	
Solution	- Re-assemble Harness. 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference (Check harness after removing Shaking cover) 3. The assembly is reverse order of disjoining	

Classification	Symptom	Service Factor
SHAKING	SHAKING error	Belt got loosen or out of way
Check point	1. Check the motor works well. 2. Check Vibrating Frame works well. → If Motor is OK, but Vibrating Frame is not working-> Belt got loosen or out of way	
Solution	- Replace belt 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. “2-1-19. Belt disassembly” Reference 4. The assembly is reverse order of disjoining	

Classification	Symptom	Service Factor
SHAKING	The unit suddenly stops with error while SHAKING	Motor error
Check point	1. Check the Motor works well. → If not, the motor is error	
Solution	- Replace a new morot. 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference 3. “2-1-20. Shaking Motor disassembly” Reference 4. The assembly is reverse order of disjointing.	

Classification	Symptom	Service Factor
SHAKING	The unit suddenly stops with error while SHAKING	Harness contact error
Check point	1. Check if the display shows an error message “ERR. C” 2. Check the Motor works well. → If the display shows “ERR. C” or the Motor does not work-> Harness contact error	
Solution	- Re-assemble Harness. 1. “2-1-2. Shaking table disassembly” Reference 2. “2-1-18. Vibrating Frame Assembly disassembly” Reference (Check harness after removing the rear cover.) 3. The assembly is reverse order of disjointing.	

2. Disassembly & Inspection

2-1. Disassembly

2-1-1. Frame Cover Disassembly



Loosen displayed bolts using of “+” Driver Separate the back side panel.



Disassembly Completion.

2-1-2. Shaking table Disassembly



Loosen bolts 4mm hexagon Wrench, Remove Washer.

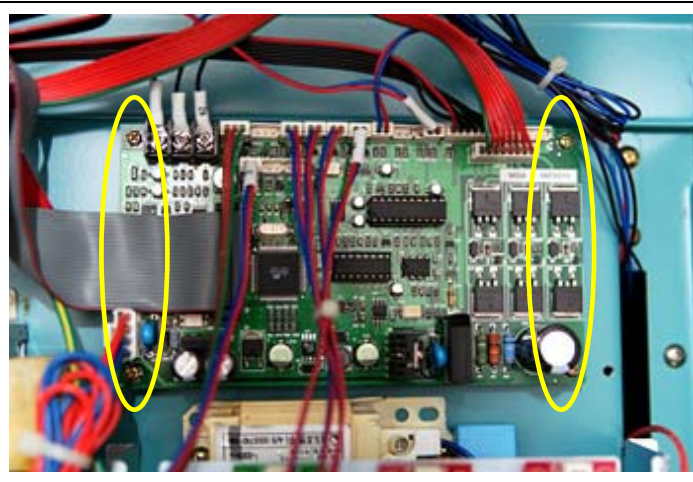


Disassembly completion.

2-1-3. Main board PCB Disassembly



Displayed part is a Main board PCB. (yellow circle)

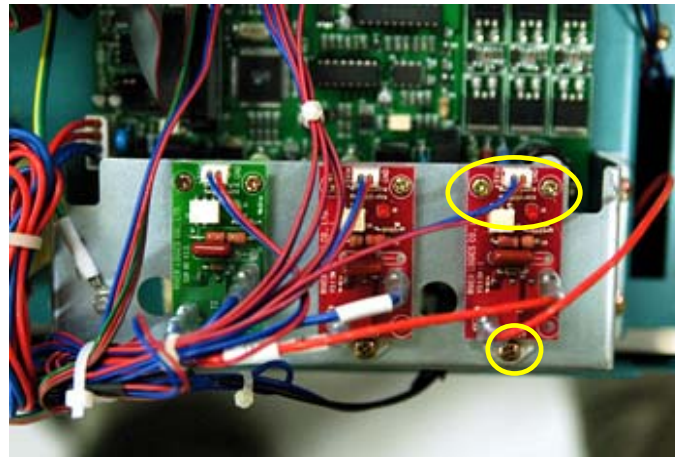


After removing electric wires, Loosen the displayed bolts to disassembly. (yellow circle)

2-1-4. SSR Disassembly



Displayed part is a SSR. (yellow circle)

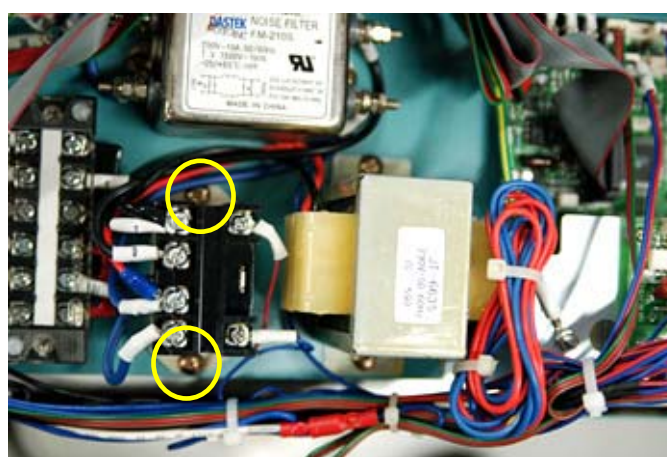


After removing electric wires, Loosen the displayed bolts to disassembly. (yellow circle)

2-1-5. Relay Disassembly

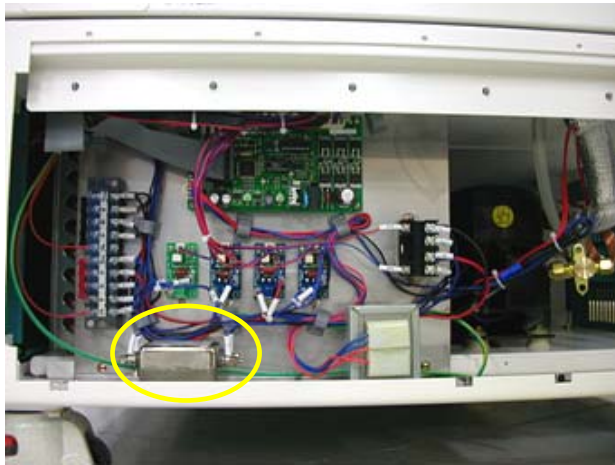


Displayed part is a Relay. (yellow circle)



After removing electric wires, Loosen the displayed bolts to disassembly. (yellow circle)

2-1-6. Noise Filter Disassembly

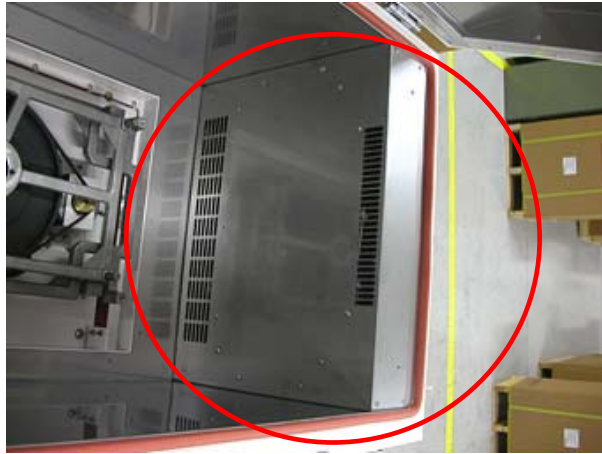


Displayed part is a Noise Filter. (yellow circle)



After removing electric wires, Loosen the displayed bolts to disassembly. (yellow circle)

2-1-7. Back side panel Disassembly



Loosen the displayed fixed bolts.(Red circle)

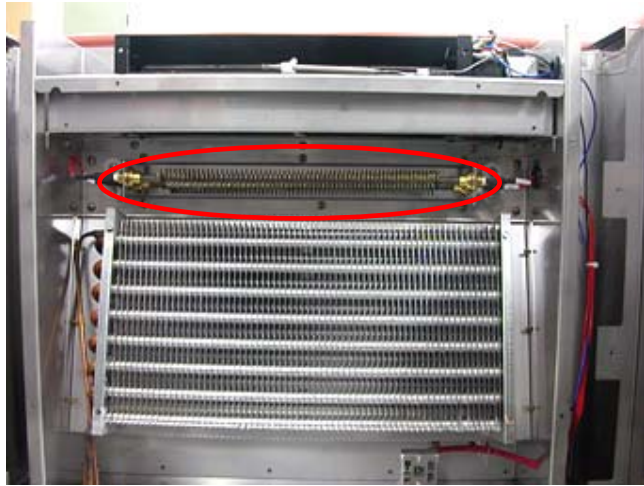


Loosen the displayed fixed bolts.
(Red circle)



Fan Cover Disassembly completion.

2-1-8. Heater Disassembly



Loosen fixing bolts on the circled, to disconnect Heater Ass'y.

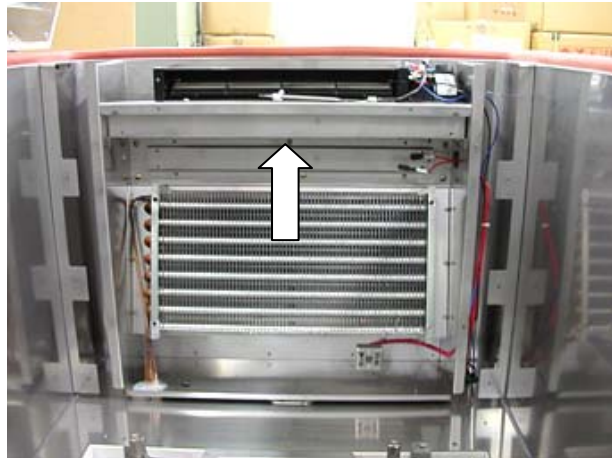


After disconnecting wires on the heater pull out to the rear direction.



Heater Disassembly done

2-1-9. Motor / Fan Disassembly



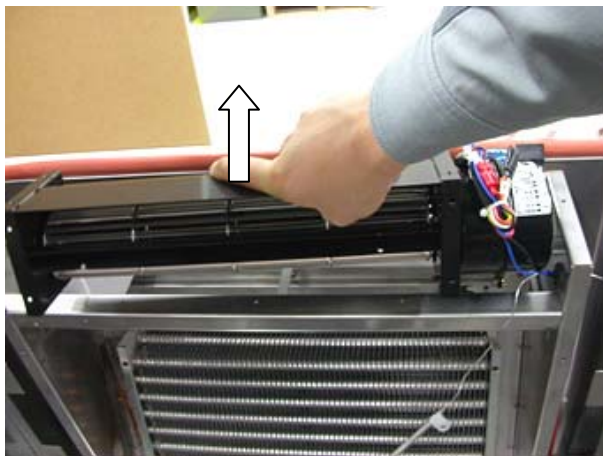
There is fixing bolts on the arrow



Loosen the bolts on the circle.

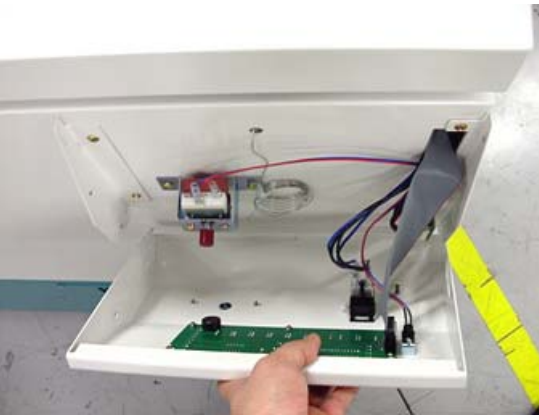
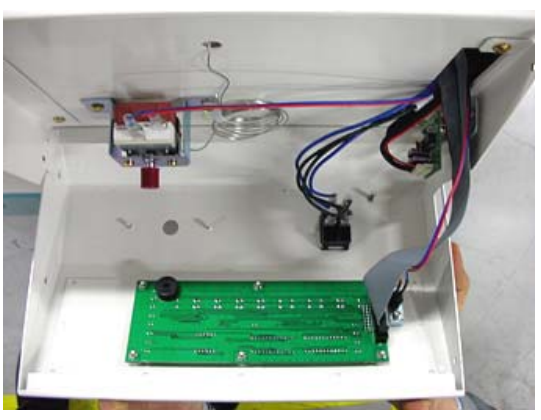


Loosen the bolts on the circle to remove fixing panel and High Temp Limit Sensor.



Pull up to disassemble

2-1-10. Display PCB Disassembly

		
Loosen the bolts on the circle.	Remove panel	Disassembly done

2-1-11. Temperature control Sensor Disassembly

		
The circled is Temperature control Sensor.	Loosen the circled bolts.	Disassembly done.

2-1-12. High Temp Limit Sensor Disassembly



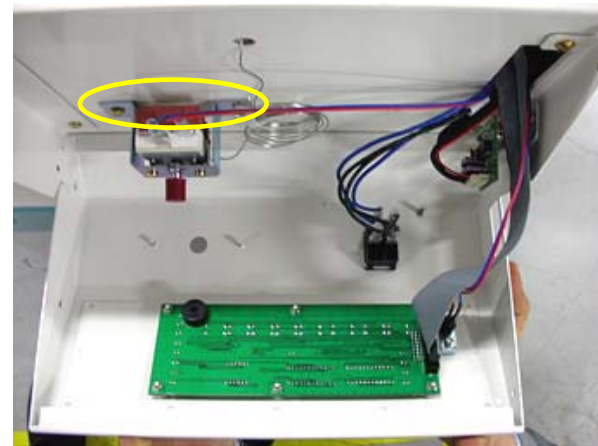
The circled is High Temp Limit Sensor.



Loosen the circled bolts.

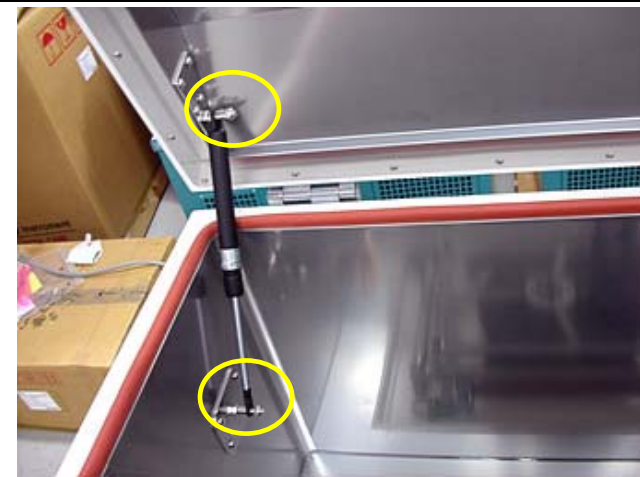


Loosen the circled bolts.



Loosen the circled bolts to disconnect.

2-1-13. Door Disassembly



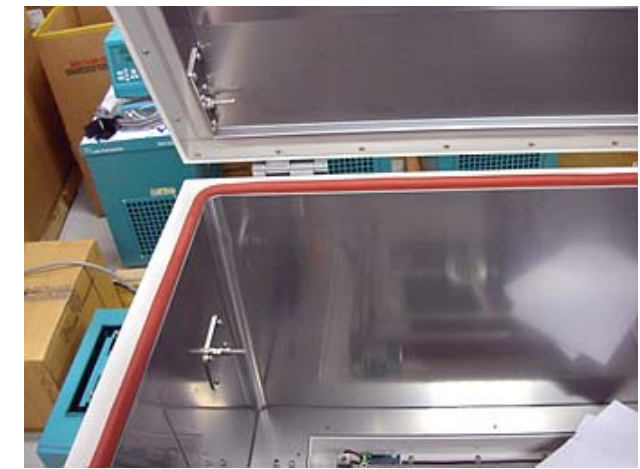
Loosen the circled bolts to disconnect gas spring.



Assembly order on gas spring.(TOP)



Assembly order on gas spring.(bottom)



Remove gas spring and close door.



You can find door hinge on the rear



Put “-“ driver on the hinge.



Turn “-” driver to the arrow direction to disconnect hinge cover.



Loosen bolts.

2-1-14. Fuse Disassembly

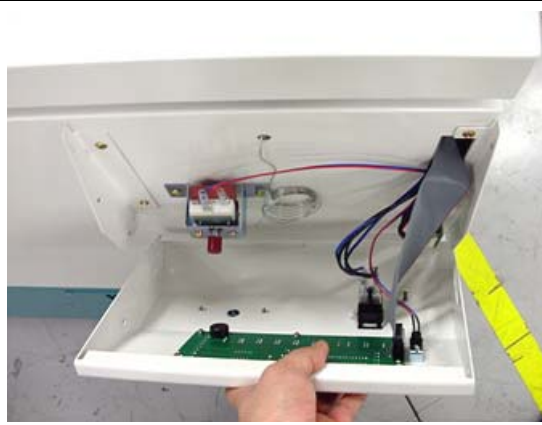


Push and turn left with “-” driver to remove fuse.

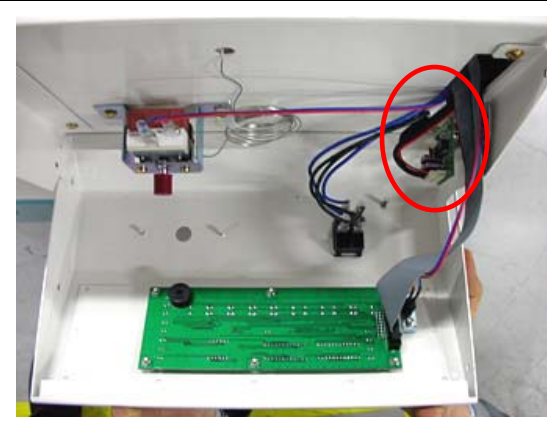
2-1-15. Communication Board Disassembly



Loosen the circled bolts.

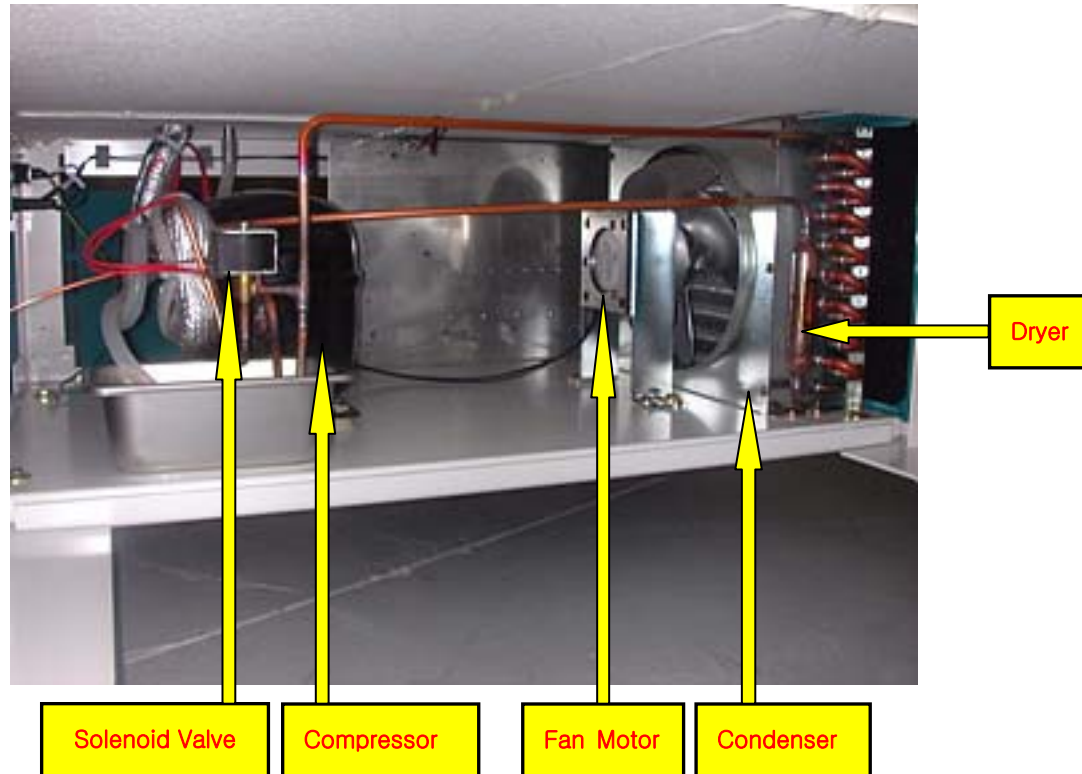


Disconnect panel



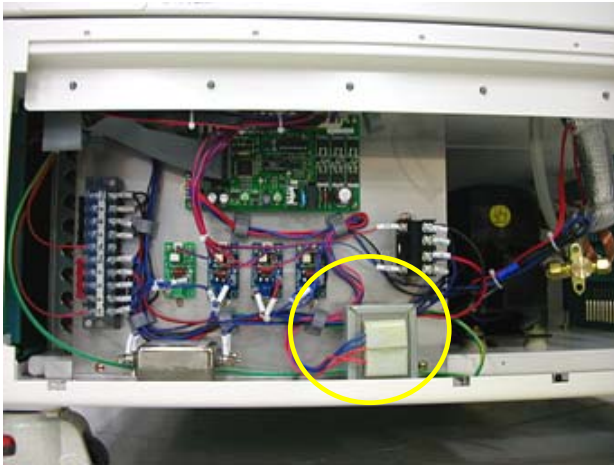
Loosen the circled bolt to remove Communication board.

2-1-16. Compressor unit Disassembly

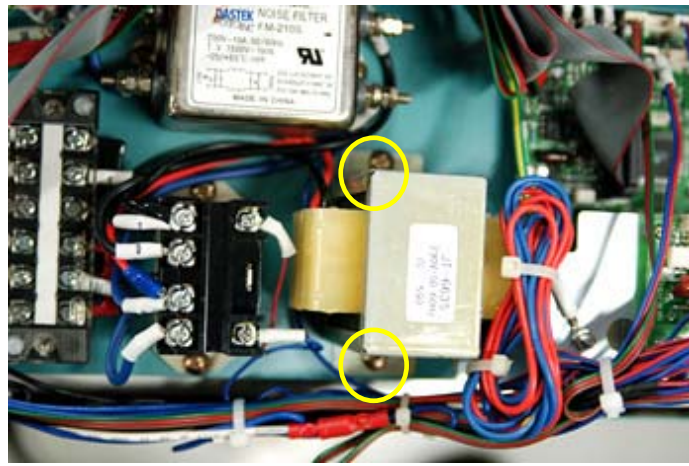


This shows compressor units.

2-1-17. Transformer Disassembly

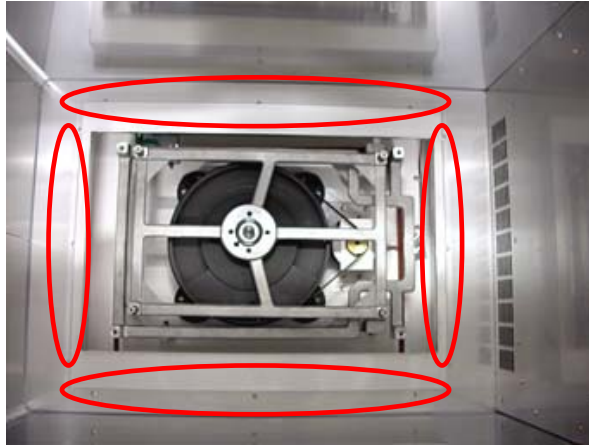


The circled shows a transformer.

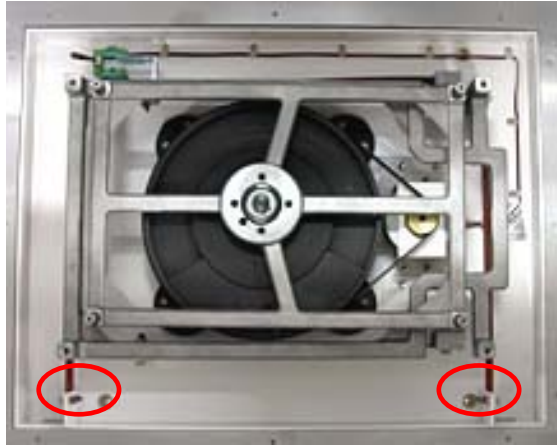


Disconnect all wires and loosen the circled bolts to remove.

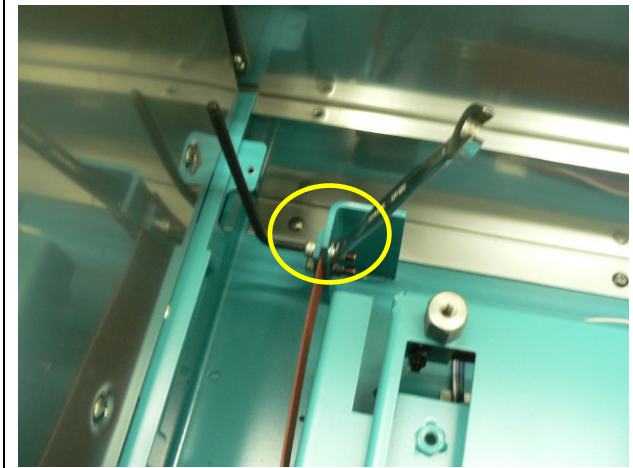
2-1-18. Vibrating Frame Assembly Disassembly



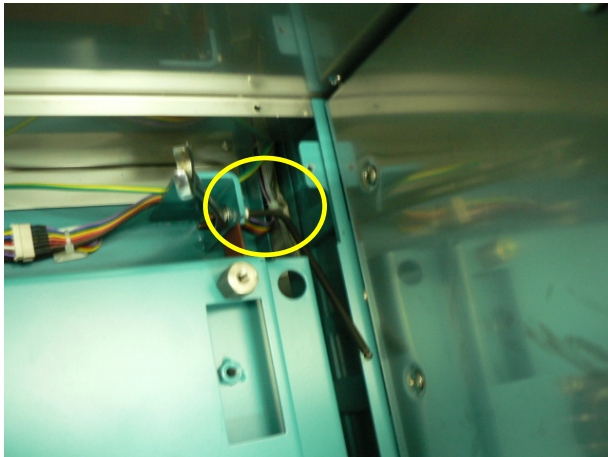
Loosen the circled bolts to remove Shaking cover.



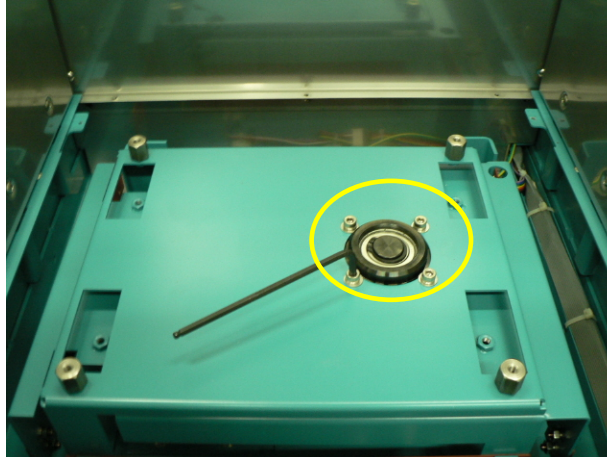
Loosen the circled bolts **(same procedure with SI Disassembly)**



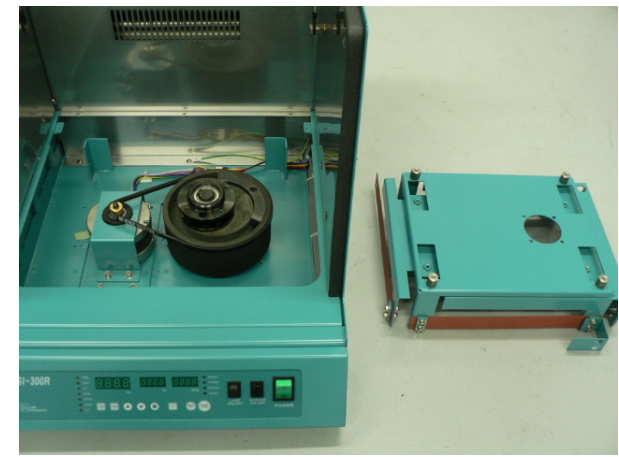
Loosen the circled by using 8mm Spanner, 4mm Wrench.



Loosen the circled by using 8mm Spanner, 4mm Wrench.

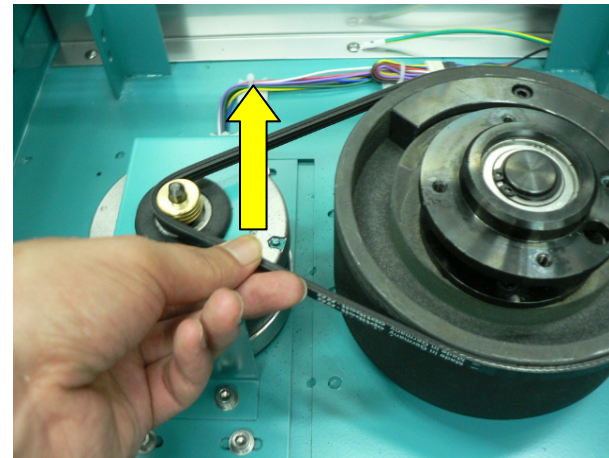


Loosen the circled by using 4mm Wrench.



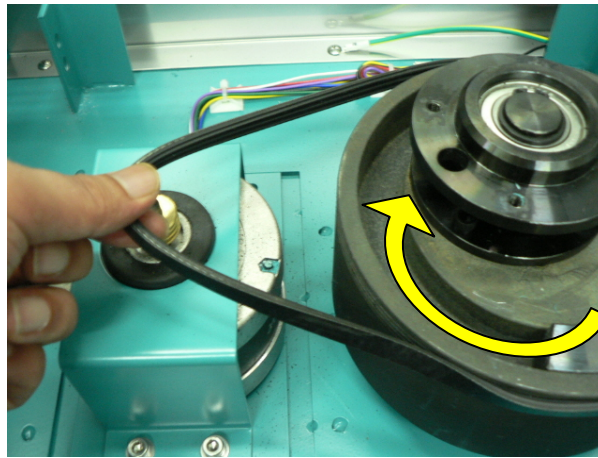
Vibrating Frame Assembly can be removed as shown.

2-1-19. Belt Disassembly

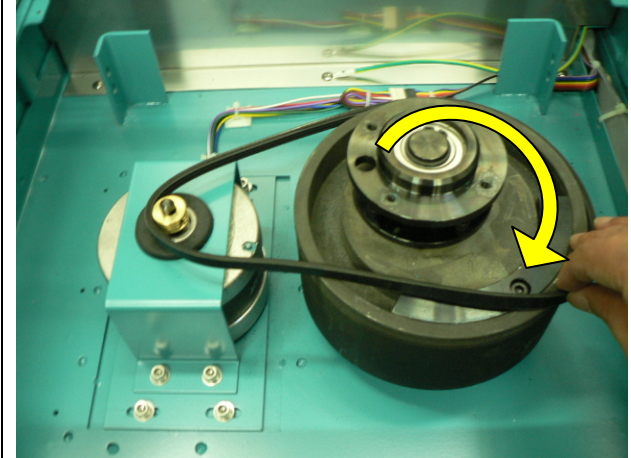


(Refer to SI Disassembly)

Hold belt and lift it up.



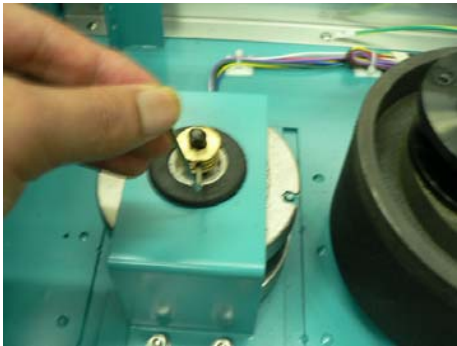
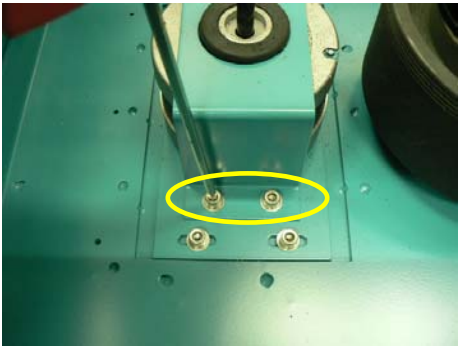
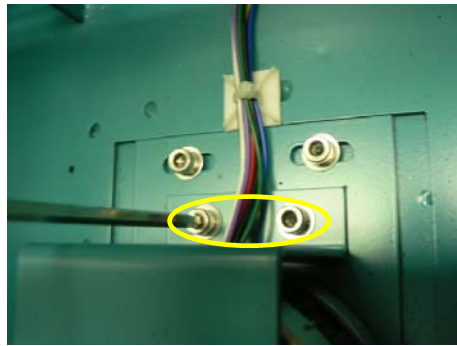
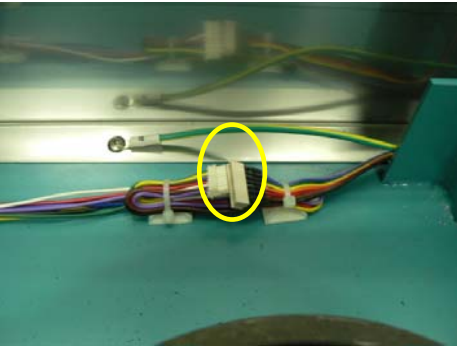
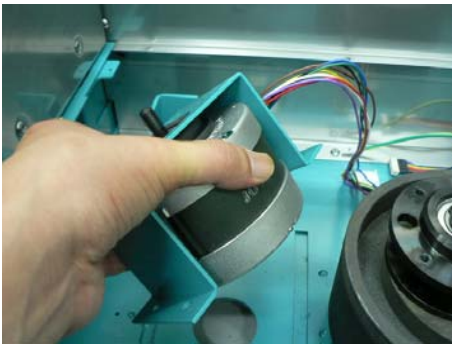
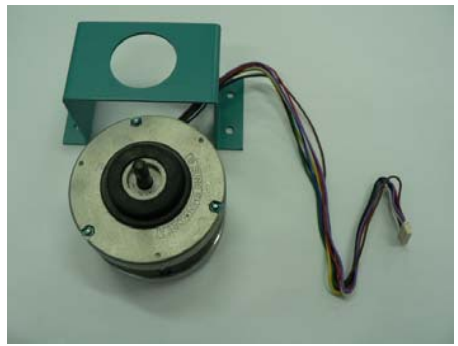
Rotate Driving wheel system when lift up belt.



Assemble :

1. Place belt at the motor.
2. Place a part of belt at the driving wheel system and rotate it.

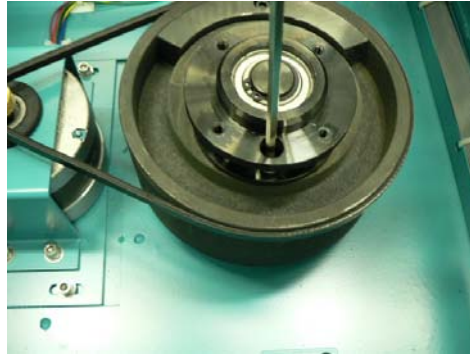
2-1-20. Shaking Motor Disassembly

			
Loose no head screw with 2mm wrench.	Take out pulley of motor.	Loose screws(yellow circle) with 4mm wrench.	Loose screws with 4mm wrench.
			
Separate harness of motor.	Separate motor and motor bracket out of the body.	Separation done.	

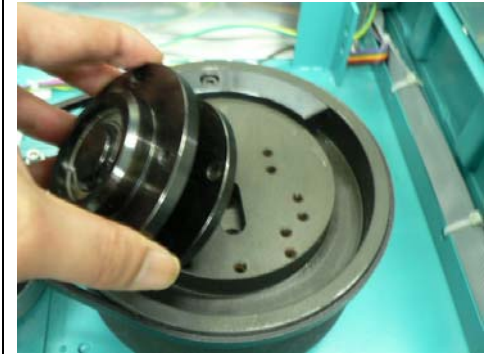
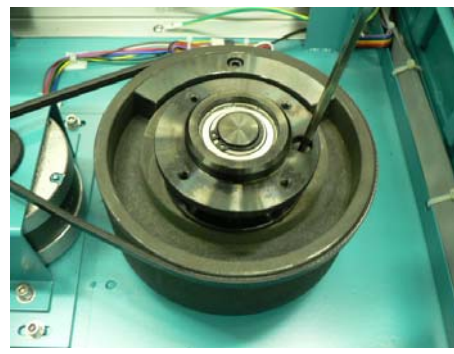
2-1-21 Rotation Pin Set Disassembly



Head of wrench screw through hole can be seen when you rotate rotation pin set.



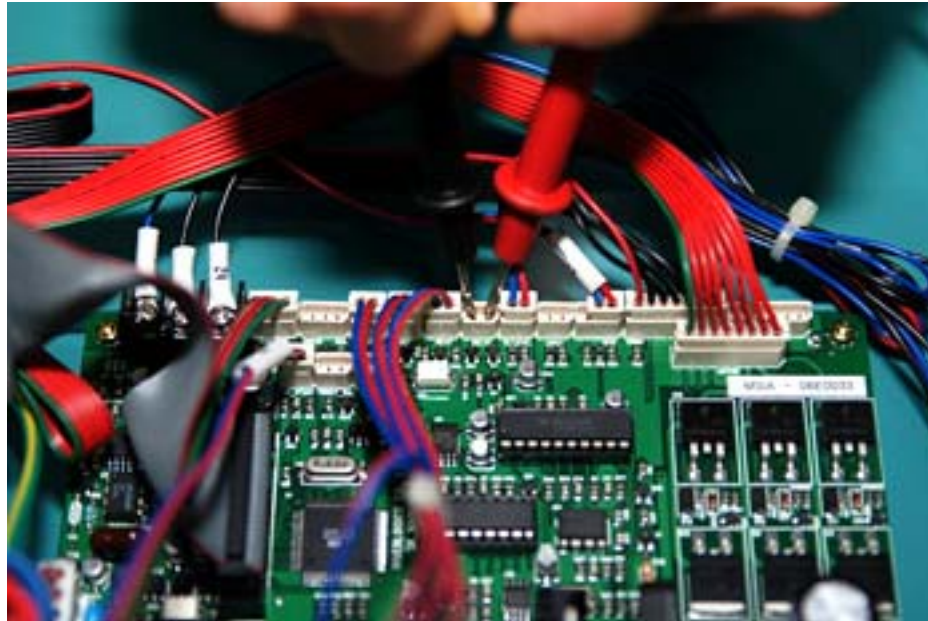
Loose screw with 4mm wrench by rotating rotation Pin Set.



Separation done.

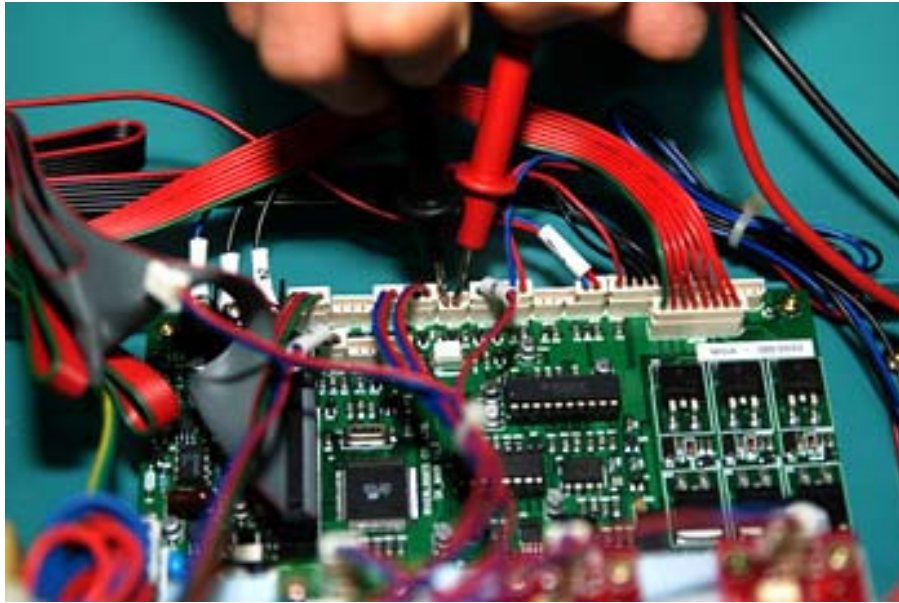
2-2. Inspection

2-2-1. Output voltage of Relay on Main Control Board



1. Press "START" key to operate unit.
2. Measure output voltage of terminal with voltage meter (DC MODE)

2-2-2. Output voltage of Heater Main Control Board



1. Set temperature above PV(actual value) and press "START" key.
2. Check out HEAT LED on display. (It should be ON.)
3. Measure output voltage of terminal with voltage meter. (DC MODE)

2-2-3. AC output power of Transformer



1. Switch ON.
2. Measure output power(blue wires, 35V) with voltage meter (AC mode)



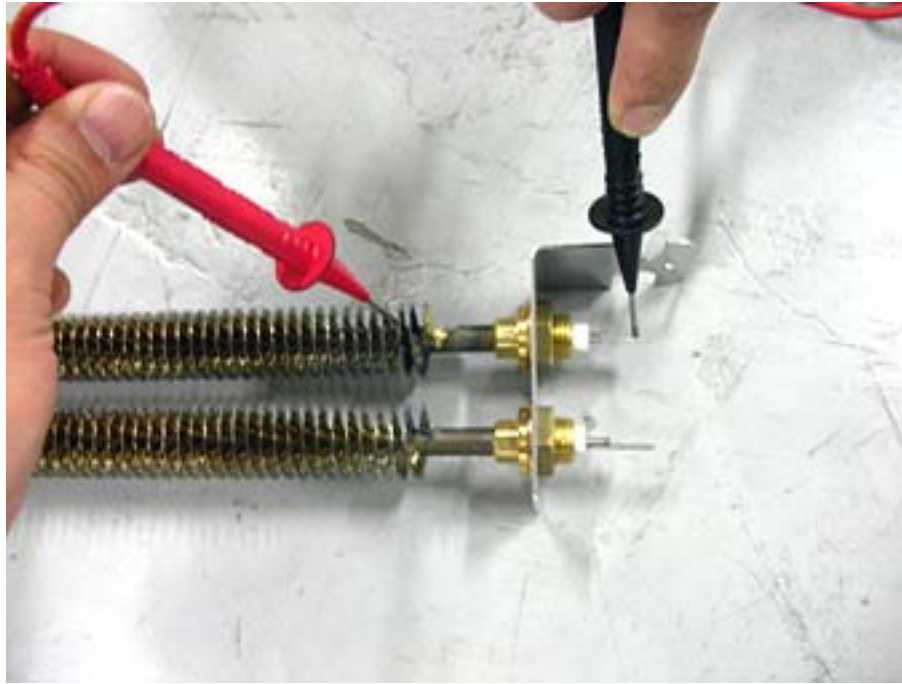
1. Switch ON.
2. Measure output power (red wires, 13.7V) with voltage meter(AC mode)

2-2-4. Short-circuit of Heater



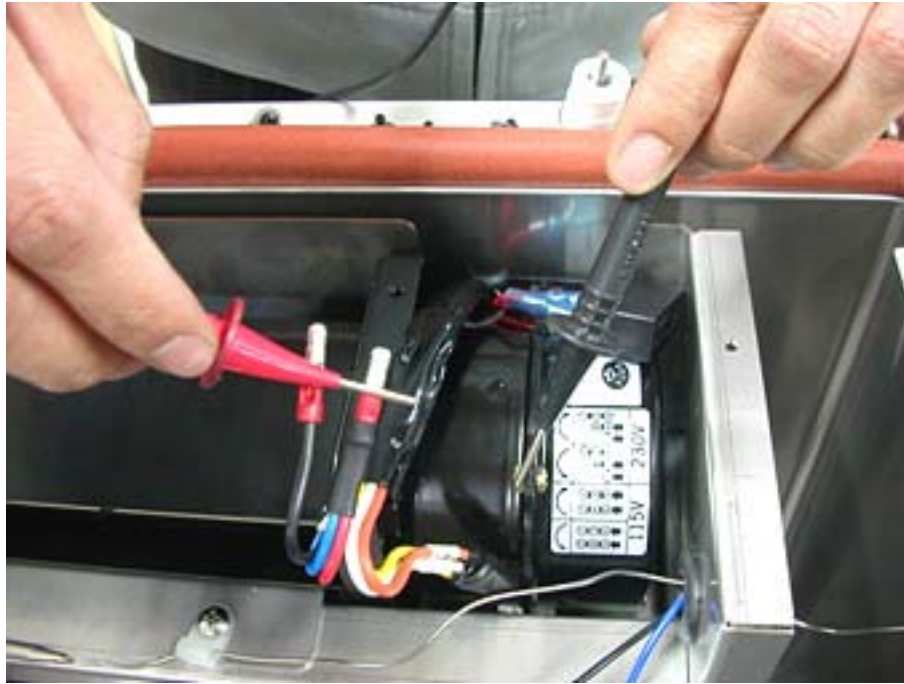
Measure two heater contact by using TESTER(resistance MODE)

2-2-5. Heater leakage



Measure resistance(resistance MODE) between Heater and heater body

2-2-6. Motor leakage check



Measure resistance between motor and terminal of input power.

2-2-7. Noise Filter defect



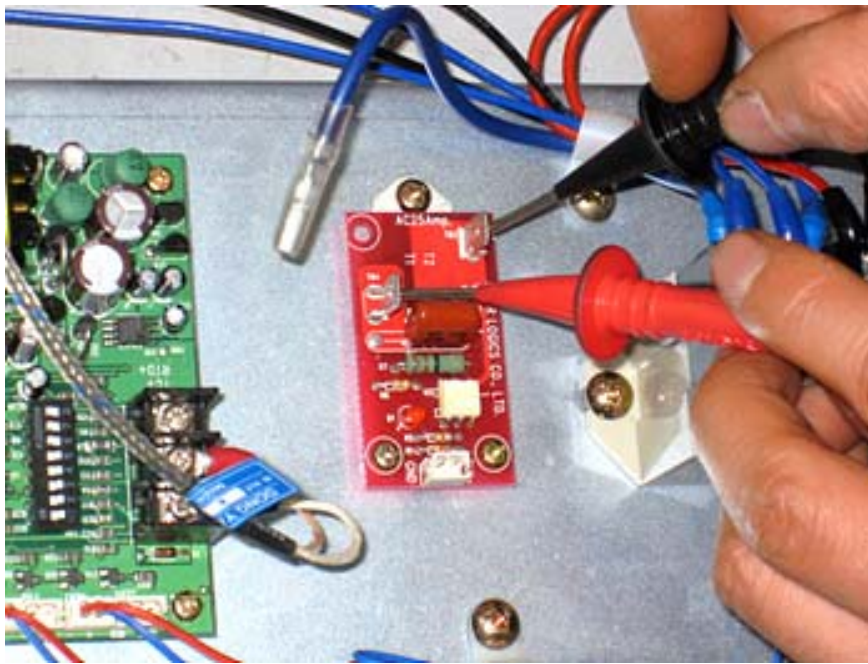
1. Switch ON.
2. Measure output voltage with voltage meter.(AC MODE)

2-2-8. Main Power Switch defect



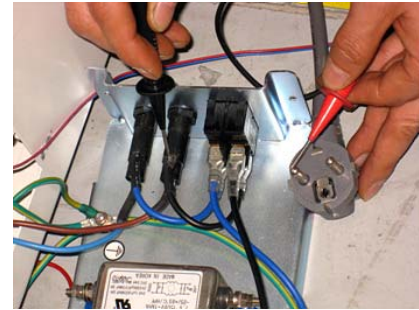
1. Switch ON.
2. Measure output voltage with voltage meter(AC MODE).

2-2-9. SSR Board defect

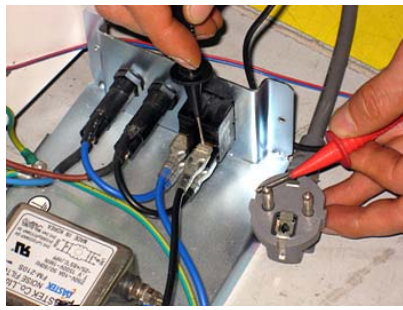


1. Take out harness of SSR input.
2. Measure resistance of SSR output with resistance meter.

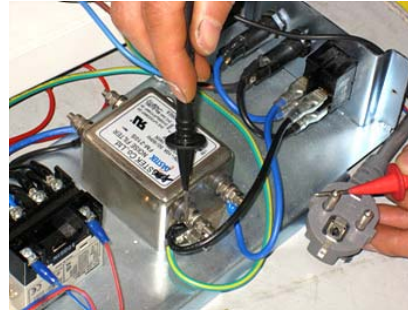
2-2-10. Wire snap



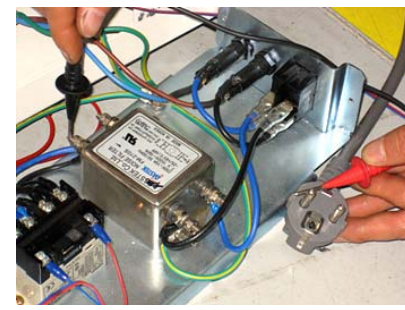
1. Resistance meter.
2. Measure resistance between plug and fuse holder.



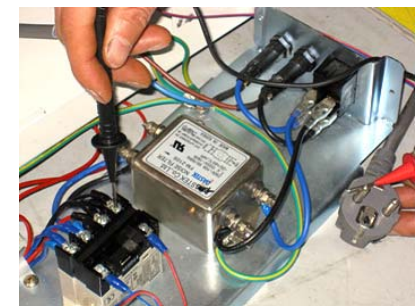
1. Switch ON.
2. Measure output between plug and main power switch.



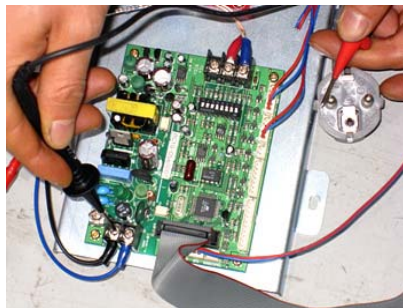
Measure between plug and Input of Noise filter.



Measure between plug and output of Noise Filter.

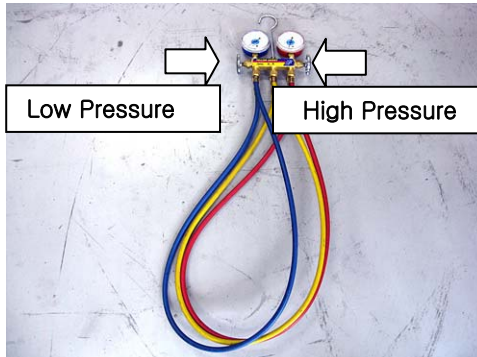
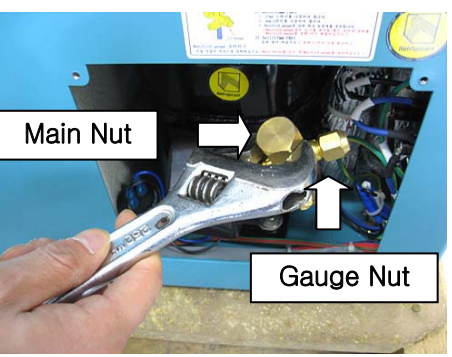
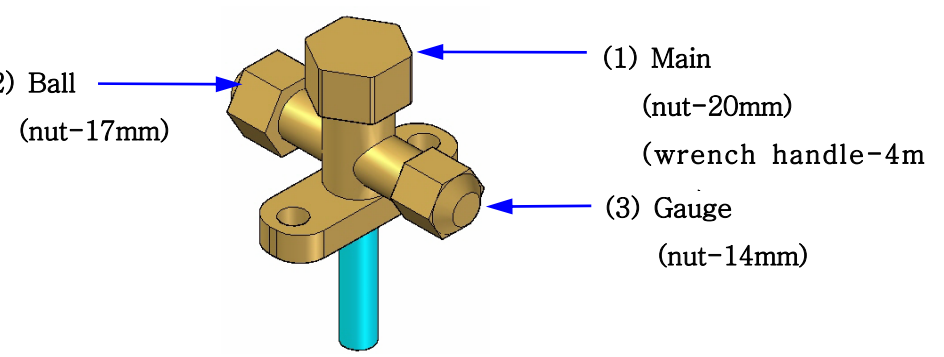


Measure between plug and Relay.



Measure between plug and input voltage (AC) of Main Board PC B.

-2-11. Connect service valve and examine pressure of refrigerant

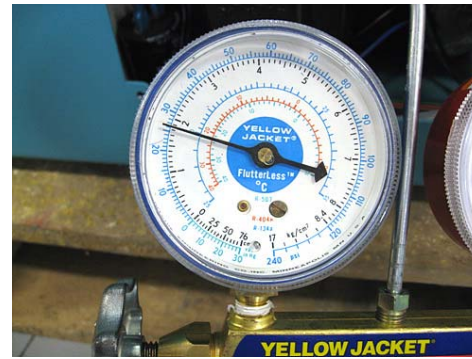
			
Prepare Manifold Gauge and close low pressure, high pressure, and line.	Read instruction carefully. (Note : Must be acknowledged.)	Loose 14mm “Gauge Nut” and 20mm “Main Nut”	connect at low pressure of manifold gauge.
			
Open 4mm wrench screw. * Clockwise : Close * Anti-clockwise : Open	Internal pressure indicates at manifold gauge.	Service valve	

2-1-12. How to recharge refrigerant



Note) Environmental temperature is nearly 25 to 30°C.

1. Connect low pressure hose to service valve.
2. Set temperature at 25°C and run unit.
3. Pressure indicator drops to low pressure immediately once compressor runs.
4. When temperature reaches 25°C and wait until temperature stabilization for around 30minutes.

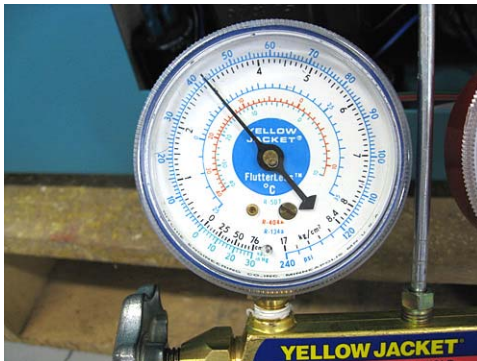


1. Check out pressure of Manifold Gauge.
- Normal : (Ambient : 25~30°C, Bath temp : 25°C)

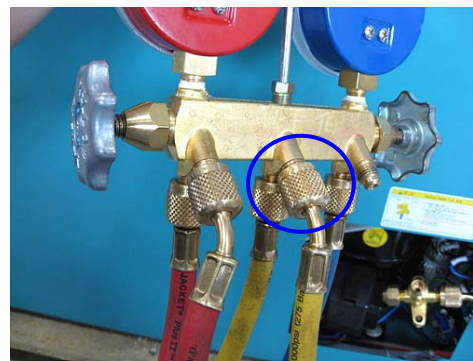
SI-300R/600R : 2.0kg/cm² / 28.4psi

SI-971R/971RF : 1.5kg/cm² / 21.3psi

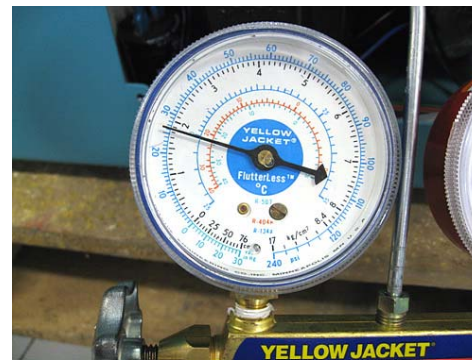
In case High pressure (overcharge)



Incase pressure indicator is high – Extract refrigerant because the symptom is due to overcharge.

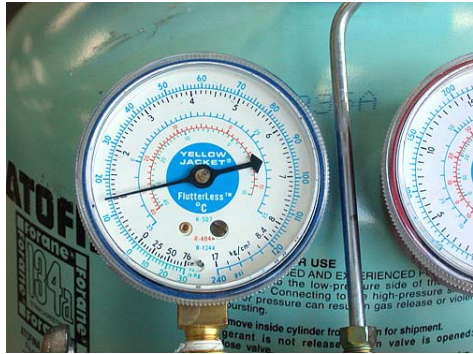


Separate hose of manifold gauge for refrigerant suction.
- Middle of 3 hoses.

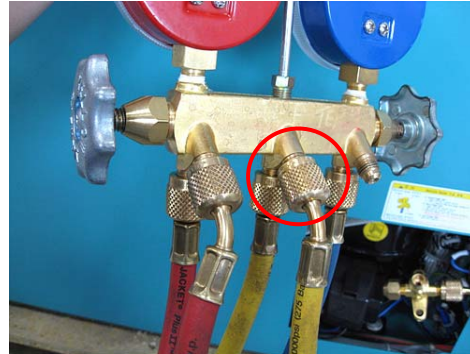


Open low pressure valve of manifold gauge and pressure indicator drops slowly with extract sound.
Note : When you open low pressure valve of manifold gauge, open about 5 sec only and close quickly and wait for stabilization (2~3nunits.) Try above action several times until pressure indicator reaches proper value.

Incase low pressure (lack of refrigerant)



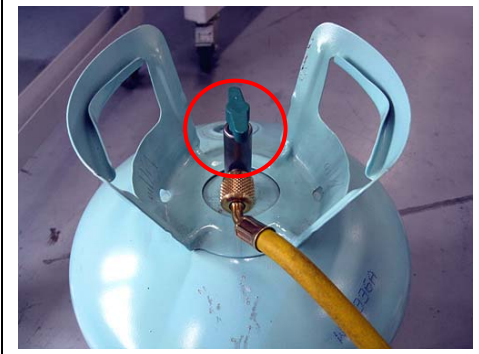
Incase pressure indicator is low – Refrigerant should be recharged due to lack of refrigerant.



Separate hose of manifold gauge for refrigerant suction.
- Middle of 3 hoses.



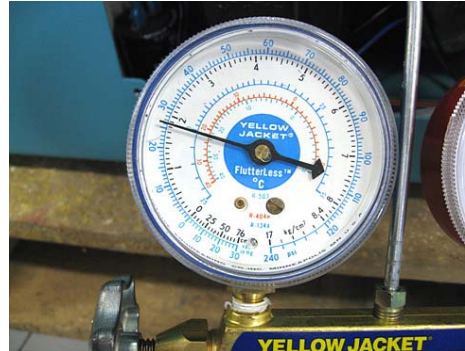
Connect line (blue circle) to refrigerant tank.



9. Open valve of tank (blue circle.) to anti-clockwise.



- ✓ Refrigerant will be filled with in the hose but air and refrigerant is mixed in the hose.
- ✓ Open valve(blue circle at the left picture) for short time to extracgt mixed air and close it.



Open low pressure valve and refrigerant goes to compressor. Pressure indicator increases.

- ✓ When you open low pressure valve of manifold gauge, open about 5 sec only and close quickly and wait for stabilization (2~3nunits.)
- ✓ Try above action several times until pressure indicator reaches proper value.



Close valve of refrigerant tank after recharge refrigerant.



Separate refrigerant suction line.

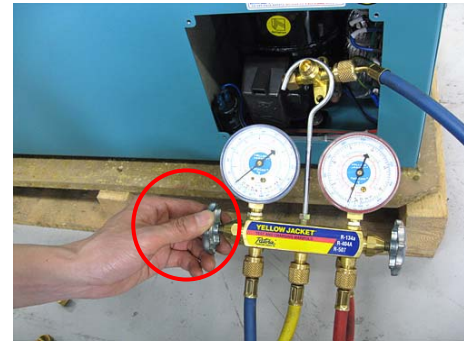


Close wrench screw with 4mm wrench driver and close 4mm gauge Nut and 20mm Main Nut.



Done.

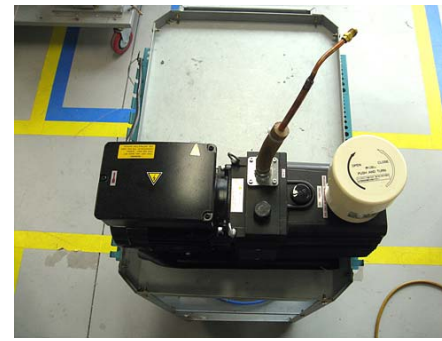
- How to insert refrigerant after vacuuming compressor



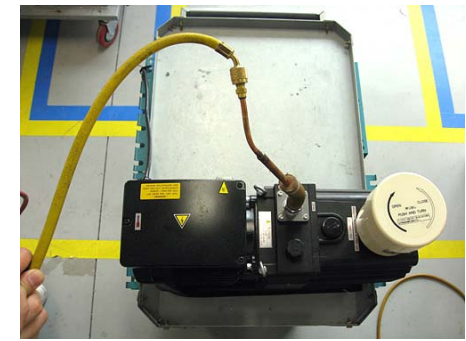
1. Open valve for low pressure of Manifold Gauge. Low pressure decreases with a gas extraction sound.



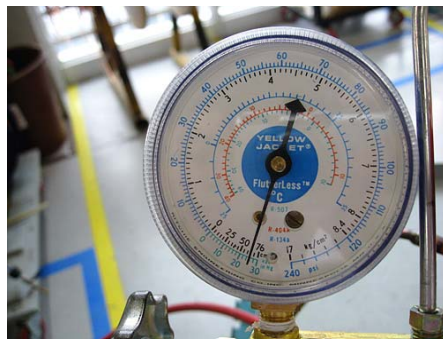
2. Wait until gas is out completely. Low pressure reaches 0 after complete gas extraction.



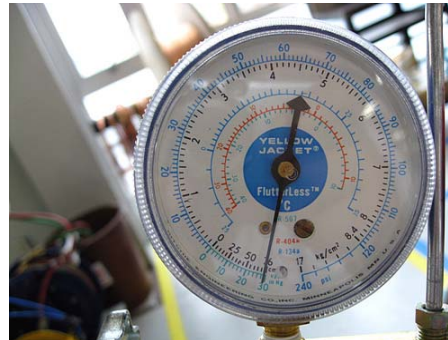
3. Prepare vacuum pump.



4. Connect suction hose of manifold gauge to vacuum pump.



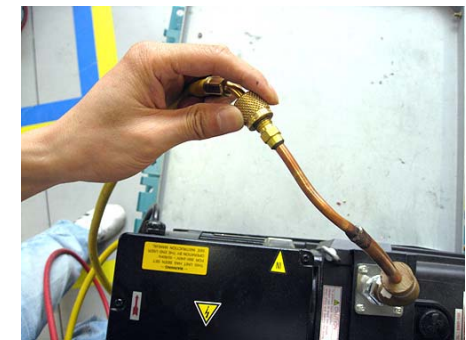
5. Operate vacuum pump. Low pressure drops rapidly once vacuum pump works.



6. Leave it for over 30minutes. Pressure reaches vacuum status after 30 minutes.



7. Close low pressure valve of manifold Gauge.



8. Disconnect suction hose from vacuum pump. A some kind of suction sound hears when disconnecting.(Normal)



9. Connect suction hose of manifold gauge to refrigerant tank and open valve of tank.



10. Open suction hose which is connected mid of manifold gauge slightly and close it.

■ Note

- ✓ Refrigerant will be filled with in the hose but air and refrigerant is mixed in the hose.
- ✓ Open valve(blue circle at the left picture) for short time to extract mixed air and close it.

■ Check point for proper refrigerant recharge.

- ✓ Eliminate factors which can affect weight of connection between manifold gauge and service valve.
- ✓ Connection status of refrigerant, manifold gauge, and service valve.
- ✓ Step 10 must be done.



11. Place refrigerant tank on balance.
Notel: If possible, digital balance is recommended with zero point setting.(Degree : 0,000g)



12. Set balance at zero.



13. Open low pressure valve of manifold gauge.

- A sound flows through hose into compressor.
- Pressure increases.
Insert speed is getting slow compared with first insertion..

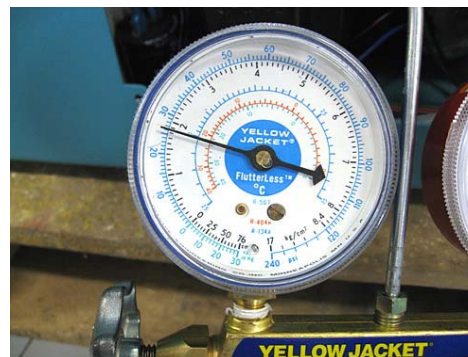
14. Switch ON and press Start/Stop key.

- Recommend that press Strat/Stop key when about 50g is inserted into compressor.

- Set temperature : 25°C
Insert speed is getting fast once unit operates.



15. Check out quantity of charged gas.



16. Check out pressure of manifold gauge.

Quantity of refrigerant;
SI-300R/600R : 160g±5g (R-134a)
SI-971R/971RF : 540g±15g (R-134a)

17. Disconnect service valve and refrigerant tank and close service valve.
 (Refer to No.11, 12, 13 of b. how to recharge refrigerant.)

“Tools”



Long nose, nipper, (+) screw driver, M8 vox screw driver, M7 box screw driver, 13mm spanner, 14mm spanner, slip joint plier, locking plier. / 4mm Wrench / Spanner

2-2-13. Current leakage of compressor



Measure resistance between input terminal and surface of compressor with resistance meter.